January 11, 1965

Director
Advanced Research Projects Agency
Washington 25, D. C.

Attention: NTDO

Subject: ARPA Order No. 292, Amend. No. 1, Program Code 4840
ARPA Order No. 300, Amend. No. 1, Program Code 4810
Name of Contractor: Stanford Research Institute
Date of Contract: 4 April 1964
Amount of Contract: $383,752
Contract Number: AF 49(638)-1363
Contract Expiration Date: 14 November 1965
Project Scientist: W H. Westphal, 415-326-6200, Ext. 2959
Short Title of Work: Local Seismicity Investigations for On-Site Inspections - PROJECT VELA CLOUD GAP
Quarterly Report No. 4 - 1 October 1964 to 1 January 1965
SRI Project No. PHU-5043

Gentlemen:

During the fourth quarter of 1964 activity on this project was devoted towards measurements of local seismicity following the SALMON event of Project DRIBBLE, the measurements of local earthquakes in the Bannock thrust of southeastern Idaho and the Juab Valley graben near Nephi, Utah.

Major Accomplishments

The fourth seismograph unit was placed in operation at SALMON, thus completing Phase I of the project. In this unit the tape recorder, seismic amplifiers, time-code generator, and associated control and test circuits are all in one waterproof container, which is lighter and occupies considerably less volume than the container of each of the

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first three units which holds only the amplifiers and time-code generator.

The four seismographs operated in the vicinity of the Tatum Salt Dome in southcentral Mississippi, both prior to and for 100 hours following the SALMON underground nuclear explosion, recorded no aftershock activity. A report on this activity has been prepared for submittal in January 1965.

On 1 November the four seismographs were moved to southeastern Idaho where considerable earthquake activity has been reported in the past few months. This operation was terminated on 26 November, when, because of the heavy snowfall, it became evident that efficient field operations were not possible with the equipment available. During this period 304 local earthquakes were observed. Analysis of these shocks was in progress at the end of this quarter.

The field operations were moved to the Juab Valley near Nephi, Utah, approximately 130 kilometers south of Salt Lake City, where local seismic monitoring took place after a magnitude 5.0 earthquake on 7 July 1963. The purpose of this move, in the absence of a suitable earthquake for investigative purposes, was (1) to examine the seismicity of the area for comparison with that observed immediately after the July 1963 shock, and (2) to provide a cold and arrid environment in which to modify and test the tape recorders, which had continued to have serious operating problems. Field operations in this area were started on 5 December and were continuing at the end of the quarter. Numerous small shocks were observed but have not been subjected to analysis. It is suspected that many were sonic booms that will require detail analysis for separation from actual earthquakes.

Table I lists the seismograph locations and spans of recording time at each of the areas investigated during this quarter.

TABLE I. Local Seismic Recording Stations - SRI Project PHU-5043
Fourth Quarter - 1964

Operation	Station	Lat. (N)	Long. (W)	In Operation From	In Operation To
SALMON	Three Points (A)	31°08.2'	89°36.1'	9-2-64[1]	10-25-64
	Snake Hollow (B)	31°04.4'	89°31.7'		
	Fire Tower (C)	31°12.0'	89°31.4'		
	Ground Zero (D)	31°08.5'	89°34.2'		
Southeast Idaho	Water Fork (A)	43°32.0'	111°17.8'	11-1-64	11-26-64
	Blackfoot (B)	43°15.8'	111°50.2'		
	Wayan (C)	42°58.4'	111°19.8'		
	Gannet Hills (D)	42°30.2'	110°54.8'		
Juab Valley, Utah	McPherson (A)	39°44.5'	111°58.0'	12-5-64	Continuing
	Parley (B)	39°35.0'	112°09.0'		
	Mills (C)	39°29.8'	112°00.2'		
	Jerusalem (D)	39°33.2'	111°39.5'		

[1]Intermittent operations until 10-22-64.

Fiscal Status

The expenditures and commitments as of 26 December 1964 were $212,608, including 58.4 technical man-months of effort. Estimated funds remaining to complete the work are $171,144.

Problems Encountered and Resolved

The major operational problems this quarter were the same as that encountered in the previous quarters—malfunctions of the Precision Instruments Model 5100 magnetic tape recorders because of jamming clutch drives and failure of the servo speed control. Installation of graphite clutches on the mechanism of the coaxial tape drives improved the situation somewhat over that existing in the last quarter, but, even so, seldom was it possible to keep four recorders in constant operation. Engineers from Precision Instruments visited the field recording locations in Utah for four days in December. They developed modified operational procedures and made minor modifications which appear to help the situation, but only further field operations will determine if the tape recorder problems have been solved.

In the last quarter it was believed that the graphite clutches would allow operations to continue when temperatures fell below -6°C. In Idaho, where temperatures as low as -25°C were encountered, field operations proved to be impossible because of freezing of the tape recorders. Two solutions to cold weather operations were tried in Utah in December. One involved putting only the tape recorder in an insulated box, and the other involved construction of a small heated plywood box to enclose the instrument system. While both these solutions worked, we adopted the heated plywood box technique as standard cold weather operational procedure. In addition to providing heat for the tape recorders, it increased the ampere-hours of power available from the lead-acid batteries used and reduced the number of cells and battery changes necessary for cold weather operations. Heat is supplied by a thermostatically controlled, small LP gas heater that consumes approximately 2 kg of propane per 24 hours when the outside air temperature averages -10°C.

Plans for Future Work

The occurrence of a magnitude 4 to 5 earthquake in an accessible area of the U.S., preferably east of the Rocky Mountains, would terminate the Juab Valley, Utah operations in favor of aftershock investigations of the earthquake. In the absence of such an earthquake the Juab Valley operation will be moved to another area, such as Baker or Fairview Peak, Nevada, or Mono Lake, California.

Action Required by the Government

None.

Respectfully submitted,

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Approved:

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